

# Lasers and Electro-Optics



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*Professor Perram is an experimentalist with research interests in laser devices, remote sensing, chemical physics, spectroscopy, environmental science, and infrared systems. He primarily supports the development of high power chemical lasers, is currently the Director of the Center for Directed Energy, and has published over 25 technical articles and reports*



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*Lt Col Marciniak's research interests include the characterization of narrow-gap semiconductors for mid-infrared lasers, coherent phasing of semiconductor lasers, and wide-band-gap semiconductor materials for high-power, high-temperature aerospace applications. He previously evaluated jamming systems at the Air Force Electronic Warfare Center, developed high-power semiconductor lasers at the Air Force Research Laboratory, and managed the Air Force Aerospace Power Technologies Program. Lt Col*

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## Research Areas

- Laser Physics and Devices
- Spectroscopy
- Nonlinear Optics
- Chemical Kinetics
- Semiconductor and Fiber Lasers
- Quantum Well Detectors
- Remote Sensing

## Recent and Ongoing Research

Experimental research in laser and optics, chemical physics, nonlinear optics, and solid state physics form the basis for advanced laser demonstrations and development. Laser programs supported by the group include:

- The Airborne Laser
- Chemical Oxygen-Iodine Lasers
- Fiber Lasers
- Short Wavelength Chemical Lasers
- Infrared Countermeasures
- Spectral Signatures from Bombs
- Pulsed Laser Deposition
- Supersonic Mixing Nozzles
- Atmospheric Photochemistry
- Spectral Lineshapes
- Phase Conjugation Experiments
- Chemical Kinetics and Energy Transfer





## Experimental Facilities

The laser and optics laboratories include:

### Chemical Physics Lab

High resolution FTIR ( $0.002\text{ cm}^{-1}$ )  
Excimer laser with pulsed dye laser  
Chemical kinetics flow tube

### Laser Spectroscopy Lab

$\text{Ar}^+$  pumped Ti:sapphire/dye ring laser  
Nd:YAG pumped pulsed dye laser  
Laser Analytics diode laser system

### Nonlinear Optics Lab

Ho:YAG laser  
Erbium fiber lasers  
GaAs/InGaAs laser diodes

### Laser Physics Lab

Nd:YAG laser (2J/pulse) with seeder  
 $\text{Ar}^+$  laser (15 W)  
Remote Sensing FTIR with telescope



**Won B. Roh**

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*Dr. Roh's research interests span technology areas covering lasers, laser spectroscopy, and nonlinear optics. Specific application areas include laser phasing/energy scaling, phase conjugation, frequency conversion, and optical diagnostics. On the AFIT faculty since 1979, he holds a joint appointment with the Sensors Directorate, ARFL, has advised 5 Ph.D. and over 40 M.S. students and has published about 40 papers.*



**Robert L. Hengehold**

Ph.D., University of Cincinnati, 1965

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*Professor Hengehold's research areas center around experimental solid state physics, semiconductor physics, optical diagnostics and electron and laser spectroscopy. He is the author of over 60 archival publications and over 150 presentations at technical meetings. He has served as advisor on over 15 doctoral dissertations and 75 master's theses.*